

Preliminary Classification:

Proposed Class:

Subclass:

NOTE: "All applicants are requested to include a preliminary classification on newly filed patent applications. The preliminary classification, preferably class and subclass designations, should be identified in the upper right-hand corner of the letter of transmittal accompanying the application papers, for example 'Proposed Class 2, subclass 129.'" M.P.E.P. § 601, 7th ed.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Box Patent Application

Assistant Commissioner for Patents

Washington, D.C. 20231

NEW APPLICATION TRANSMITTAL

Transmitted herewith for filing is the patent application of

Inventor(s): Vesa TERVO, Satu MAKELA

WARNING: 37 C.F.R. § 1.41(a)(1) points out:

"(a) A patent is applied for in the name or names of the actual inventor or inventors.

"(1) The inventorship of a nonprovisional application is that inventorship set forth in the oath or declaration as prescribed by § 1.63, except as provided for in § 1.53(d)(4) and § 1.63(d). If an oath or declaration as prescribed by § 1.63 is not filed during the pendency of a nonprovisional application, the inventorship is that inventorship set forth in the application papers filed pursuant to § 1.53(b), unless a petition under this paragraph accompanied by the fee set forth in § 1.17(f) is filed supplying or changing the name or names of the inventor or inventors."

For (title): METHOD FOR STORING AND INFORMING PROPERTIES OF A WIRELESS COMMUNICATION DEVICE

CERTIFICATION UNDER 37 C.F.R. § 1.10*

(Express Mail label number is mandatory.)

(Express Mail certification is optional.)

I hereby certify that this New Application Transmittal and the documents referred to as attached therein are being deposited with the United States Postal Service on this date April 28, 2000, in an envelope as "Express Mail Post Office to Addressee," mailing Label Number EL336863023US addressed to the: Assistant Commissioner for Patents, Washington, D.C. 20231.

Debra G. Conrad

(type or print name of person mailing paper)



Signature of person mailing paper

WARNING: Certificate of mailing (first class) or facsimile transmission procedures of 37 C.F.R. § 1.8 cannot be used to obtain a date of mailing or transmission for this correspondence.

***WARNING:** Each paper or fee filed by "Express Mail" **must** have the number of the "Express Mail" mailing label placed thereon prior to mailing. 37 C.F.R. § 1.10(b).

"Since the filing of correspondence under § 1.10 without the Express Mail mailing label thereon is an oversight that can be avoided by the exercise of reasonable care, requests for waiver of this requirement will **not** be granted on petition." Notice of Oct. 24, 1996, 60 Fed. Reg. 56,439, at 56,442.

(New Application Transmittal [4-1]—page 1 of 11)

1. Type of Application

This new application is for a(n)

(check one applicable item below)

- ☒ Original (nonprovisional)
☐ Design
☐ Plant

WARNING: Do not use this transmittal for a completion in the U.S. of an International Application under 35 U.S.C. § 371(c)(4), unless the International Application is being filed as a divisional, continuation or continuation-in-part application.

WARNING: Do not use this transmittal for the filing of a provisional application.

NOTE: If one of the following 3 items apply, then complete and attach ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF A PRIOR U.S. APPLICATION CLAIMED and a NOTIFICATION IN PARENT APPLICATION OF THE FILING OF THIS CONTINUATION APPLICATION.

- ☐ Divisional.
☐ Continuation.
☐ Continuation-in-part (C-I-P).

2. Benefit of Prior U.S. Application(s) (35 U.S.C. §§ 119(e), 120, or 121)

NOTE: A nonprovisional application may claim an invention disclosed in one or more prior filed copending nonprovisional applications or copending international applications designating the United States of America. In order for a nonprovisional application to claim the benefit of a prior filed copending nonprovisional application or copending international application designating the United States of America, each prior application must name as an inventor at least one inventor named in the later filed nonprovisional application and disclose the named inventor's invention claimed in at least one claim of the later filed nonprovisional application in the manner provided by the first paragraph of 35 U.S.C. § 112. Each prior application must also be:

(i) An international application entitled to a filing date in accordance with PCT Article 11 and designating the United States of America; or

(ii) Complete as set forth in § 1.51(b); or

(iii) Entitled to a filing date as set forth in § 1.53(b) or § 1.53(d) and include the basic filing fee set forth in § 1.16; or

(iv) Entitled to a filing date as set forth in § 1.53(b) and have paid therein the processing and retention fee set forth in § 1.21(f) within the time period set forth in § 1.53(f).

37 C.F.R. § 1.78(a)(1).

NOTE: If the new application being transmitted is a divisional, continuation or a continuation-in-part of a parent case, or where the parent case is an International Application which designated the U.S., or benefit of a prior provisional application is claimed, then check the following item and complete and attach ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED.

WARNING: If an application claims the benefit of the filing date of an earlier filed application under 35 U.S.C. §§ 120, 121 or 365(c), the 20-year term of that application will be based upon the filing date of the earliest U.S. application that the application makes reference to under 35 U.S.C. §§ 120, 121 or 365(c). (35 U.S.C. § 154(a)(2) does not take into account, for the determination of the patent term, any application on which priority is claimed under 35 U.S.C. §§ 119, 365(a) or 365(b).) For a c-i-p application, applicant should review whether any claim in the patent that will issue is supported by an earlier application and, if not, the applicant should consider canceling the reference to the earlier filed application. The term of a patent is not based on a claim-by-claim approach. See Notice of April 14, 1995, 60 Fed. Reg. 20,195, at 20,205.

(New Application Transmittal [4-1]—page 2 of 11)

002240 "042200"

WARNING: When the last day of pendency of a provisional application falls on a Saturday, Sunday, or Federal holiday within the District of Columbia, any nonprovisional application claiming benefit of the provisional application must be filed prior to the Saturday, Sunday, or Federal holiday within the District of Columbia. See 37 C.F.R. § 1.78(a)(3).

- ☐ The new application being transmitted claims the benefit of prior U.S. application(s). Enclosed are ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED.

3. Papers Enclosed

A. Required for filing date under 37 C.F.R. § 1.53(b) (Regular) or 37 C.F.R. § 1.153 (Design) Application

26 Pages of specification

10 Pages of claims

4 Sheets of drawing

WARNING: DO NOT submit original drawings. A high quality copy of the drawings should be supplied when filing a patent application. The drawings that are submitted to the Office must be on strong, white, smooth, and non-shiny paper and meet the standards according to § 1.84. If corrections to the drawings are necessary, they should be made to the original drawing and a high-quality copy of the corrected original drawing then submitted to the Office. Only one copy is required or desired. For comments on proposed then-new 37 C.F.R. § 1.84, see Notice of March 9, 1988 (1990 O.G. 57-62).

NOTE: "Identifying indicia, if provided, should include the application number or the title of the invention, inventor's name, docket number (if any), and the name and telephone number of a person to call if the Office is unable to match the drawings to the proper application. This information should be placed on the back of each sheet of drawing a minimum distance of 1.5 cm. (5/8 inch) down from the top of the page . . ." 37 C.F.R. § 1.84(c)).

(complete the following, if applicable)

- ☐ The enclosed drawing(s) are photograph(s), and there is also attached a "PETITION TO ACCEPT PHOTOGRAPH(S) AS DRAWING(S)." 37 C.F.R. § 1.84(b).

☐ formal

☐ informal

B. Other Papers Enclosed

 Pages of declaration and power of attorney

1 Pages of abstract

 Other

4. Additional papers enclosed

- ☐ Amendment to claims
- ☐ Cancel in this applications claims _____ before calculating the filing fee. (At least one original independent claim must be retained for filing purposes.)
- ☐ Add the claims shown on the attached amendment. (Claims added have been numbered consecutively following the highest numbered original claims.)
- ☒ Preliminary Amendment
- ☒ Information Disclosure Statement (37 C.F.R. § 1.98)
- ☒ Form PTO-1449 (PTO/SB/08A and 08B)
- ☒ Citations

- ☐ Declaration of Biological Deposit
- ☐ Submission of "Sequence Listing," computer readable copy and/or amendment pertaining thereto for biotechnology invention containing nucleotide and/or amino acid sequence.
- ☐ Authorization of Attorney(s) to Accept and Follow Instructions from Representative
- ☐ Special Comments
- ☐ Other

NOTE: A newly executed declaration is not required in a continuation or divisional application provided that the prior nonprovisional application contained a declaration as required, the application being filed is by all or fewer than all the inventors named in the prior application, there is no new matter in the application being filed, and a copy of the executed declaration filed in the prior application (showing the signature or an indication thereon that it was signed) is submitted. The copy must be accompanied by a statement requesting deletion of the names of person(s) who are not inventors of the application being filed. If the declaration in the prior application was filed under § 1.47, then a copy of that declaration must be filed accompanied by a copy of the decision granting § 1.47 status or, if a nonsigning person under § 1.47 has subsequently joined in a prior application, then a copy of the subsequently executed declaration must be filed. See 37 C.F.R. §§ 1.63(d)(1)–(3).

NOTE: A declaration filed to complete an application must be executed, identify the specification to which it is directed, identify each inventor by full name including family name and at least one given name, without abbreviation together with any other given name or initial, and the residence, post office address and country or citizenship of each inventor, and state whether the inventor is a sole or joint inventor. 37 C.F.R. § 1.63(a)(1)-(4).

- ☐ Enclosed
Executed by

(check all applicable boxes)

- ☐ inventor(s).
- ☐ legal representative of inventor(s).
37 C.F.R. §§ 1.42 or 1.43.
- ☐ joint inventor or person showing a proprietary interest on behalf of inventor who refused to sign or cannot be reached.
 - ☐ This is the petition required by 37 C.F.R. § 1.47 and the statement required by 37 C.F.R. § 1.47 is also attached. See item 13 below for fee.

- ☒ Not Enclosed.

NOTE: Where the filing is a completion in the U.S. of an International Application or where the completion of the U.S. application contains subject matter in addition to the International Application, the application may be treated as a continuation or continuation-in-part, as the case may be, utilizing ADDED PAGE FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION CLAIMED.

- ☒ Application is made by a person authorized under 37 C.F.R. § 1.41(c) on behalf of *all* the above named inventor(s).

(The declaration or oath, along with the surcharge required by 37 C.F.R. § 1.16(e) can be filed subsequently).

- ☐ Showing that the filing is authorized.
(not required unless called into question. 37 C.F.R. § 1.41(d))

6. Inventorship Statement

WARNING: If the named inventors are each not the inventors of all the claims an explanation, including the ownership of the various claims at the time the last claimed invention was made, should be submitted.

The inventorship for all the claims in this application are:

☐ The same.

or

☐ Not the same. An explanation, including the ownership of the various claims at the time the last claimed invention was made,

☐ is submitted.

☐ will be submitted.

7. Language

NOTE: An application including a signed oath or declaration may be filed in a language other than English. An English translation of the non-English language application and the processing fee of \$130.00 required by 37 C.F.R. § 1.17(k) is required to be filed with the application, or within such time as may be set by the Office. 37 C.F.R. § 1.52(d).

☒ English

☐ Non-English

☐ The attached translation includes a statement that the translation is accurate. 37 C.F.R. § 1.52(d).

8. Assignment

☒ An assignment of the invention to Nokia Mobile Phones Ltd.

☐ is attached. A separate ☐ "COVER SHEET FOR ASSIGNMENT (DOCUMENT) ACCOMPANYING NEW PATENT APPLICATION" or ☐ FORM PTO 1595 is also attached.

☒ will follow.

NOTE: "If an assignment is submitted with a new application, send two separate letters—one for the application and one for the assignment." Notice of May 4, 1990 (1114 O.G. 77-78).

WARNING: A newly executed "CERTIFICATE UNDER 37 C.F.R. § 3.73(b)" must be filed when a continuation-in-part application is filed by an assignee. Notice of April 30, 1993, 1150 O.G. 62-64.

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0956380 042300 00240 0809560

9. Certified Copy

Certified copy(ies) of application(s)

Country	Appln. No.	Filed
Finland	991000	30 April 1999
Country	Appln. No.	Filed
Country	Appln. No.	Filed

from which priority is claimed

☒ Is (are) attached.☐ will follow.

NOTE: The foreign application forming the basis for the claim for priority must be referred to in the oath or declaration. 37 C.F.R. § 1.55(a) and 1.63.

NOTE: This item is for any foreign priority for which the application being filed directly relates. If any parent U.S. application or International Application from which this application claims benefit under 35 U.S.C. § 120 is itself entitled to priority from a prior foreign application, then complete Item 18 on the ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED.

10. Fee Calculation (37 C.F.R. § 1.16)A. ☒ Regular application

CLAIMS AS FILED						
Number filed			Number Extra		Rate	Basic Fee 37 C.F.R. § 1.16(a) \$ 690.00
Total						
Claims (37 C.F.R. § 1.16(c))	57	- 20 =	37	×	\$ 18.00	666.00
Independent						
Claims (37 C.F.R. § 1.16(b))	5	- 3 =	2	×	\$ 78.00	156.00
Multiple dependent claim(s), If any (37 C.F.R. § 1.16(d))						
				+	\$260.00	

☐ Amendment cancelling extra claims is enclosed.☒ Amendment deleting multiple-dependencies is enclosed.☐ Fee for extra claims is not being paid at this time.

NOTE: If the fees for extra claims are not paid on filing they must be paid or the claims cancelled by amendment, prior to the expiration of the time period set for response by the Patent and Trademark Office in any notice of fee deficiency. 37 C.F.R. § 1.16(d).

Filing Fee Calculation

\$ 1,512.00

B. ☐ Design application

(\$310.00—37 C.F.R. § 1.16(f))

Filing Fee Calculation

\$

C. ☐ Plant application

(\$480.00—37 C.F.R. § 1.16(g))

Filing fee calculation

\$

11. Small Entity Statement(s)

- ☐ Statement(s) that this is a filing by a small entity under 37 C.F.R. § 1.9 and 1.27 is (are) attached.

WARNING: "Status as a small entity must be specifically established in each application or patent in which the status is available and desired. Status as a small entity in one application or patent does not affect any other application or patent, including applications or patents which are directly or indirectly dependent upon the application or patent in which the status has been established. The refiling of an application under § 1.53 as a continuation, division, or continuation-in-part (including a continued prosecution application under § 1.53(d)), or the filing of a reissue application requires a new determination as to continued entitlement to small entity status for the continuing or reissue application. A nonprovisional application claiming benefit under 35 U.S.C. § 119(e), 120, 121, or 365(c) of a prior application, or a reissue application may rely on a statement filed in the prior application or in the patent if the nonprovisional application or the reissue application includes a reference to the statement in the prior application or in the patent or includes a copy of the statement in the prior application or in the patent and status as a small entity is still proper and desired. The payment of the small entity basic statutory filing fee will be treated as such a reference for purposes of this section." 37 C.F.R. § 1.28(a)(2).

WARNING: "Small entity status must not be established when the person or persons signing the . . . statement can unequivocally make the required self-certification." M.P.E.P., § 509.03, 6th ed., rev. 2, July 1996 (emphasis added).

(complete the following, if applicable)

- ☐ Status as a small entity was claimed in prior application
_____/_____, filed on _____, from which benefit
is being claimed for this application under:

35 U.S.C. § ☐ 119(e),
☐ 120,
☐ 121,
☐ 365(c),

and which status as a small entity is still proper and desired.

- ☐ A copy of the statement in the prior application is included.

Filing Fee Calculation (50% of A, B or C above)

\$ _____

NOTE: Any excess of the full fee paid will be refunded if small entity status is established and a refund request are filed within 2 months of the date of timely payment of a full fee. The two-month period is not extendable under § 1.136. 37 C.F.R. § 1.28(a).

12. Request for International-Type Search (37 C.F.R. § 1.104(d))

(complete, if applicable)

- ☐ Please prepare an international-type search report for this application at the time when national examination on the merits takes place.

13. Fee Payment Being Made at This Time

☐ Not Enclosed

☐ No filing fee is to be paid at this time.

(This and the surcharge required by 37 C.F.R. § 1.16(e) can be paid subsequently.)

☒ Enclosed

☒ Filing fee

\$ 1,512.00

☒ Recording assignment

(\$40.00; 37 C.F.R. § 1.21(h))

(See attached "COVER SHEET FOR
ASSIGNMENT ACCOMPANYING NEW
APPLICATION".)

\$ _____

☐ Petition fee for filing by other than all the
inventors or person on behalf of the inventor
where inventor refused to sign or cannot be
reached

(\$130.00; 37 C.F.R. §§ 1.47 and 1.17(i))

\$ _____

☐ For processing an application with a
specification in

a non-English language

(\$130.00; 37 C.F.R. §§ 1.52(d) and 1.17(k))

\$ _____

☐ Processing and retention fee

(\$130.00; 37 C.F.R. §§ 1.53(d) and 1.21(l))

\$ _____

☐ Fee for international-type search report

(\$40.00; 37 C.F.R. § 1.21(e))

\$ _____

NOTE: 37 C.F.R. § 1.21(f) establishes a fee for processing and retaining any application that is abandoned for failing to complete the application pursuant to 37 C.F.R. § 1.53(f) and this, as well as the changes to 37 C.F.R. §§ 1.53 and 1.78(a)(1), indicate that in order to obtain the benefit of a prior U.S. application, either the basic filing fee must be paid, or the processing and retention fee of § 1.21(f) must be paid, within 1 year from notification under § 53(f).

Total fees enclosed

\$ 1,512.00

14. Method of Payment of Fees

☒ Check in the amount of \$ 1,512.00

☐ Charge Account No. _____ in the amount of
\$ _____

A duplicate of this transmittal is attached.

NOTE: Fees should be itemized in such a manner that it is clear for which purpose the fees are paid. 37 C.F.R. § 1.22(b).

15. Authorization to Charge Additional Fees

WARNING: If no fees are to be paid on filing, the following items should not be completed.

WARNING: Accurately count claims, especially multiple dependent claims, to avoid unexpected high charges, if extra claim charges are authorized.

- ☒ The Commissioner is hereby authorized to charge the following additional fees by this paper and during the entire pendency of this application to Account No. 16-1350:

☒ 37 C.F.R. § 1.16(a), (f) or (g) (filing fees)

☒ 37 C.F.R. § 1.16(b), (c) and (d) (presentation of extra claims)

NOTE: Because additional fees for excess or multiple dependent claims not paid on filing or on later presentation must only be paid or these claims cancelled by amendment prior to the expiration of the time period set for response by the PTO in any notice of fee deficiency (37 C.F.R. § 1.16(d)), it might be best not to authorize the PTO to charge additional claim fees, except possibly when dealing with amendments after final action.

☒ 37 C.F.R. § 1.16(e) (surcharge for filing the basic filing fee and/or declaration on a date later than the filing date of the application)

☒ 37 C.F.R. § 1.17(a)(1)-(5) (extension fees pursuant to § 1.136(a)).

☐ 37 C.F.R. § 1.17 (application processing fees)

NOTE: "... A written request may be submitted in an application that is an authorization to treat any concurrent or future reply, requiring a petition for an extension of time under this paragraph for its timely submission, as incorporating a petition for extension of time for the appropriate length of time. An authorization to charge all required fees, fees under § 1.17, or all required extension of time fees will be treated as a constructive petition for an extension of time in any concurrent or future reply requiring a petition for an extension of time under this paragraph for its timely submission. Submission of the fee set forth in § 1.17(a) will also be treated as a constructive petition for an extension of time in any concurrent reply requiring a petition for an extension of time under this paragraph for its timely submission." 37 C.F.R. § 1.136(a)(3).

☐ 37 C.F.R. § 1.18 (issue fee at or before mailing of Notice of Allowance, pursuant to 37 C.F.R. § 1.311(b))

NOTE: Where an authorization to charge the issue fee to a deposit account has been filed before the mailing of a Notice of Allowance, the issue fee will be automatically charged to the deposit account at the time of mailing the notice of allowance. 37 C.F.R. § 1.311(b).

NOTE: 37 C.F.R. § 1.28(b) requires "Notification of any change in status resulting in loss of entitlement to small entity status must be filed in the application . . . prior to paying, or at the time of paying, . . . the issue fee. . . ." From the wording of 37 C.F.R. § 1.28(b), (a) notification of change of status must be made even if the fee is paid as "other than a small entity" and (b) no notification is required if the change is to another small entity.

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16. Instructions as to Overpayment

NOTE: "... Amounts of twenty-five dollars or less will not be returned unless specifically requested within a reasonable time, nor will the payer be notified of such amounts; amounts over twenty-five dollars may be returned by check or, if requested, by credit to a deposit account." 37 C.F.R. § 1.26(a).

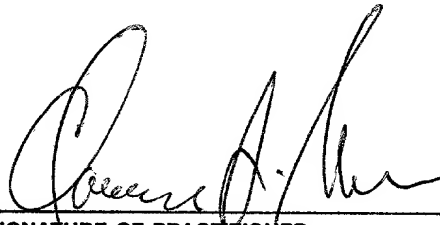
- ☒ Credit Account No. 16-1350
☐ Refund

SEND ALL CORRESPONDENCE TO:

Reg. No. 24,622

Tel. No. (203) 259-1800

Customer No.



SIGNATURE OF PRACTITIONER

Clarence A. Green

(type or print name of attorney)

PERMAN & GREEN, LLP

P.O. Address

425 Post Road, Fairfield, Connecticut 06430

003240 08E0360

☐ **Incorporation by reference of added pages**

(check the following item if the application in this transmittal claims the benefit of prior U.S. application(s) (including an international application entering the U.S. stage as a continuation, divisional or C-I-P application) and complete and attach the ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED)

- ☐ Plus Added Pages for New Application Transmittal Where Benefit of Prior U.S. Application(s) Claimed

Number of pages added _____

- ☐ Plus Added Pages for Papers Referred to in Item 4 Above

Number of pages added _____

- ☐ Plus added pages deleting names of inventor(s) named in prior application(s) who is/are no longer inventor(s) of the subject matter claimed in this application.

Number of pages added _____

- ☐ Plus "Assignment Cover Letter Accompanying New Application"

Number of pages added _____

☒ **Statement Where No Further Pages Added**

(if no further pages form a part of this Transmittal, then end this Transmittal with this page and check the following item)

- ☒ This transmittal ends with this page.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Express Mail No.: EL336863023US

In re Application of: TERVO et al.

SERIAL NUMBER:

EXAMINER:

FILING DATE: Herewith

ART UNIT:

TITLE: METHOD FOR STORING AND INFORMING PROPERTIES OF A
WIRELESS COMMUNICATION DEVICE

ATTORNEY DOCKET NO.: 460-009368-US(PAR)

The Commissioner of Patents and Trademarks

Washington, D.C. 20231

PRELIMINARY AMENDMENT

Dear Sir:

Please amend the above-identified, enclosed patent application as follows:

IN THE CLAIMS:

Please amend Claims 3, 5, 6, 7, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 29, 30, 34, 35, 36, 37, 38, 39, 40, 43, 45, 46, 47, 49, 51, 52, 53, 54 and 55 as shown below.

Claim 3, line 1, delete "or 2".

Claim 5, line 1, delete "2, 3 or 4,".

Claim 6, line 1, delete "any of the claims 1 to 5" and insert --claim 1--.

Claim 7, line 1, delete "any of the claims 1 to 6" and insert --claim 1--.

Claim 10, line 1, delete "8 or 9,".

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Claim 29, line 2, delete “or 28”.

Claim 53, lines 1 and 2, delete “any of claims 41 to 52” and insert --claim 41--.

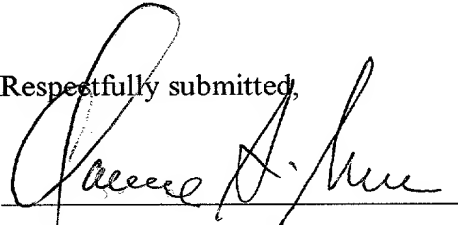
Claim 54, lines 1 and 2, delete "any of claims 41 to 53" and insert --claim 41--.

Claim 55, lines 1 and 2, delete "any of claims 41 to 54" and insert --claim 41--.

REMARKS

Please enter this preliminary amendment prior to calculation of the fees.

Respectfully submitted,



Clarence A. Green, Reg. No. 24,622

Perman & Green, LLP

425 Post Road

Fairfield, CT 06430

(203) 259-1800

28 April 2000

Date

008240" 08E09550

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images, communication in e.g. company Intranet networks, interactive games, and transmission of music. These applications are particularly characterised by their demand for a connection with a sufficiently high speed data communication capacity between the communication devices in the communication network, and by the fact that the data transmission is often conducted in short sequences.

For example in the present GSM system, data transmission between communication devices, such as a mobile station and a base transceiver station, on one logical radio channel is conducted at the rate of 9.6 kbit/s. A high speed circuit switched data (HSCSD) service has also been developed for the GSM system, where the data transmission capacity is as high as 64 kbit/s. Thus, this service uses all the eight logical radio channels of the physical radio channel for data transmission between the mobile station and the base transceiver station. In this way, the user of the mobile station can be offered digital services to an ISDN network and the communication devices of its service providers at a rate of 64 kbit/s. Another system based on the GSM system is the general packet radio service (GPRS) system. This system improves the efficiency of communication, because the same logical radio channel can be used by several different mobile subscribers. For example, data transmission between a mobile station and a base transceiver station takes place only when necessary, and the logical radio channel is not reserved for communication between only one mobile station and base transceiver station. There is a so-called virtual data transmission connection between the mobile station and the GPRS system. The data transmission capacity of the current GPRS system on one logical radio channel is as high as 21 kbit/s, and as high as 171 kbit/s when all the logical radio channels are used. Future systems supporting wireless multimedia include the wide-band UMTS system (Universal Mobile Telecommunications System) aiming at high speed which can achieve instantaneous data rates as high as several megabits/s.

In third-generation systems, the concepts of a bearer service and a service are introduced. A bearer service generally corresponds to the older concept of a traffic channel, defining for example the data rate and quality of service (QoS) that will be provided by the system for

transferring information between a mobile station and some other part of the system. For example, a bearer service between the mobile station and a base station is a radio bearer service, and a bearer service between a radio network controller and a core network is an lu bearer service (Interface UMTS bearer). The interface between a radio network controller and a core network is called the lu interface. A service, on the other hand, is provided by a mobile communication system to fulfil a specific task, e.g. data services carry out data transfer in the communication system, call services are associated with phone calls, multimedia, etc. A major task for the operation of a third-generation mobile communications system is to manage (set up, maintain and terminate, as necessary) the bearer services so that each requested service can be provided to the mobile stations without wasting the available bandwidth.

The quality of service level defines, for instance, how packet data units (PDU) are processed in a GPRS network during transmission. For example, the quality of service levels defined for the connection addresses are used to control the order of transmission, buffering (packet queues) and discarding of packets in the support node and in the gateway support node, especially when there are two or more connections which have packets to be transmitted simultaneously. Different quality of service levels define different delays for packet transmissions between different ends of the connection, different bit rates and the number of discarded packet data units.

Also in e.g. circuit switched networks, such as high speed circuit switched networks, it is possible to define several quality of service levels for each connection. Different quality of service levels can be achieved e.g. by reserving a different number of logical channels for a connection.

For each connection (connection address), it is possible to request a different quality of service level. For example in e-mail connections, a relatively long delay can be allowed in the message transmission. However, interactive applications, for example, require high-speed packet transmission. In some applications, as in file transfer, it is

important that the packet transmission is error free, wherein packet data units are re-transmitted in error situations, if necessary.

For using multimedia services, a communication device, such as a wireless communication device, sets up a data transmission connection with a PLMN network and the server of a communication device of this network providing the multimedia services. Such a service may be a message service, such as a short message transmission service (SMS) or a paging service. The destination communication device with which communication is established and its server may also be located in another PLMN network.

Not all the communication devices of a communication network, such as the mobile stations connected with a PLMN network, have the capabilities to support e.g. video calls, faster data transmission connections or data transmission in packet form. However, it must also be possible to use devices of older generations and/or devices with limited options in a communication network supporting communication devices with more varied options. Consequently, the network should be able to connect conventional mobile phones which, in addition to transmission of speech, support only data transmission in text form, such as SMS messages, and wireless communication devices with which it is possible to use e.g. services of the Internet network. One current example of a wireless communication device with extended capabilities is the Nokia 9110 Communicator, in which the properties of a cellular mobile telephone (CMT) and a personal digital assistant (PDA) are combined. Hereafter in this text, this device and future developments thereof will be referred to using the term Communicator. In the future it is also likely that wireless communication devices will be adapted for the use of multimedia, i.e. there will be multimedia communication devices, suitable for the reception of graphics, audio and moving images. Communication devices that can be connected to the PSTN network are also being developed to include for example telephones that transmit calls via the Internet network, or which also transmit video images.

One problem in prior art systems is that the mobile communication network is not aware of all the properties of the communication devices

it is intended to connect. Therefore the mobile communication network may try to connect a call to a receiving communication device even if that device cannot handle the call properly. For example, the call might be a data call with a desired data rate of 14400 bit/s, but the receiving communication device is only able to send and receive at 9600 bit/s.

Another problem with prior art systems is that the communication devices of service providers in a communication network do not know all the properties of the receiving communication device, which affect data transmission and the presentation of information. Thus, for example a server offering multimedia services may transmit information to a mobile station, a Communicator or a wireless multimedia communication device in a form that is not compatible with the device, or the information cannot be received at all. Thus, for example, the resolution of the graphics to be transmitted may be too high for the reproduction capacity of the display of the receiving device; the moving video image or image information to be transmitted may be coded in a form that is not recognised by the receiving device; or the interactive application contains e.g. a form to be filled in but entering data is not possible with the receiving device, or it requires a pointing device to fill the form but the receiving device is not equipped with a pointing device. However, if data transmission is conducted in spite of the above-mentioned problems of prior art, this will result in a waste of capacity available in the communication network. The problems of the receiving device, due to incompatibility, will lead to failure situations or delays in the network, which may load or hamper other communication in the network. If the multimedia service is available only in a receiving communication device with certain options, this will have the result that either the user of the device will not receive the desired services, the device must be replaced with a suitable one, or several devices must be acquired for using different services.

It is known to connect a mobile phone or a radio card to a personal computer. This enables the personal computer to communicate with e.g. another personal computer, a server, or a communication device, such as a mobile phone or a Communicator. Furthermore, the personal computer may or may not include some peripheral devices, such as a pointing device, a high resolution display, a sound card, etc. The

storage capacity (hard disk, random access memory, etc.) of the personal computer may also vary.

5 In order to function correctly, multimedia applications which include real time video, require the processor of the wireless communication device and/or the personal computer to operate at high speed. If a user attempts to use such an application, there should be means to check if the personal computer and the communication device connected to it are capable of fulfilling the performance requirements of the application. In prior art systems, a great deal of signalling is required between the personal computer and the server in which the application is stored to check if it is possible to execute the application.

15 In a prior art system, the user of the personal computer first establishes a call via the communication device to communicate with the server in which the application is stored. When the call is set up, the personal computer and the server negotiate concerning the properties of the personal computer, the communication device, and the requirements of the application. As a result of this negotiation process, the application is started, if the properties of the personal computer and the communication device fulfil the requirements. Otherwise, the call is advantageously terminated. It is also possible that such negotiation cannot be performed and the connection may not be properly carried out. Useless transmission of irrelevant information may also overload the communication network.

25 The purpose of the present invention is to reduce the drawbacks of prior art and to achieve a considerable improvement in data transmission between communication devices in a communication network. More precisely, the method of the invention is characterised in that parameter data representing at least one property of said wireless communication device is stored in said wireless communication device, and transmitted from said wireless communication device to the mobile communication network. These device properties can actually be physical or functional and may also include e.g. preferences for the use of communication resources. The wireless communication device of the invention is characterised in that it further comprises:

- means for storing parameter data representing said at least one property of the wireless communication device, and
- 5 — means for transmitting the parameter data from the wireless communication device to said mobile communication network.

The wireless communication system of the invention is characterised in that the system further comprises:

- 10 — means for storing parameter data representing said at least one property of the wireless communication device in the wireless communication device, and
- 15 — means for transmitting the parameter data from the wireless communication device to said mobile communication network.

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20 An important principle of the invention is that information about the properties of the wireless communication device is transmitted to the mobile communication network which utilizes the information when, for example, registration is requested to the mobile communication network. The information could also be used at other times. Therefore the mobile communication network can optimize the services and filter out impossible connections. Further, information is transmitted e.g. from a server offering multimedia services to the receiving

25 communication device, such as a mobile phone, Communicator or multimedia communication device, only in a form in which the receiving communication device can utilise it. For this purpose, the method of the invention is created e.g. for transmitting parameter data describing the properties of a communication device to the mobile communications

30 network. The parameter data is advantageously stored within the International Mobile Station Equipment Identity of the wireless communication device. In the following, the invention will be described in more detail by using several examples for implementing the method in a communication network.

35 The invention gives several considerable advantages related to the operation of the communication network, such as a PLMN network, as well as advantages obtained by the mobile subscriber. The most impor-

tant advantage is that by using the method of the invention, it is possible to improve the efficiency of data transmission between communication devices so that the properties of the receiving device, such as a wireless multimedia communication device, are taken into account in data transmission more comprehensively than in prior art. Thus, the capacity of the communication network is not wasted unnecessarily, whereby the data transmission is optimised according to the requirements of each subscriber. The signalling between the communication device and the communication network during call set-up is not substantially affected by the method of the invention, which also reduces the amount of communication needed to set up a connection when compared to prior art solutions where communication devices negotiate at the beginning of a call to determine the best possible format for communication. The invention also enables the communication network to support devices with different options and levels of sophistication, thus prolonging the useful lifetime of communication devices and improving the possibilities for their use. Moreover, the problems of incompatibility of devices in the communication network are reduced, and error situations and delays which may load the communication network are reduced with respect to prior art. Furthermore, according to an advantageous embodiment of the invention, the device property information is stored temporarily in the mobile communication network wherein memory usage in the network is more efficient and large permanent data stores containing device property information are not required.

In the following, the invention will be described in more detail with reference to the appended drawings, in which

- Fig. 1 is a schematic view showing a general mobile communication network based on a cellular network,
- Fig. 2 describes an International Mobile Station Equipment Identity according to the prior art,
- Fig. 3 is a block diagram of a wireless communication device that can be used in the mobile communication network shown in Fig. 1,

Fig. 4 illustrates the transmission of parameter data describing the properties of a communication device during registration to the communication network, using an advantageous embodiment of the method of the invention, and

Fig. 5 is an advantageous embodiment of an information frame to be used to transmit parameter data describing the properties of a wireless communication device.

As shown in Fig. 1, the public land mobile network (PLMN) based on a cellular network, such as the GSM system, comprises, in a known manner, several communication devices, such as wireless communication devices (MS) MS1—MS4 and a base station subsystem BSS. This base station subsystem BSS usually comprises several base transceiver stations (BTS) BTS1, BTS2, BTS3 which are distributed within a geographical area and each base transceiver station serves a cell comprising at least part of this geographical area. Communication, such as transmission and reception of speech and data, between a wireless communication device MS1 located in the area of the cell served by the base transceiver station BTS1, and the base transceiver station BTS1 takes place via radio communication RC1 using radio channels reserved for the cell. The operation of the base transceiver stations BTS1 and BTS2 is controlled by a base station controller (BSC) BSC1 belonging to the base station subsystem BSS and serving the purpose of controlling the use of radio channels and controlling channel changes. The base station controller BSC1 communicates with a mobile services switching centre (MSC) MSC1 which serves the purpose of transmitting connections between the base transceiver stations BTS1—BTS3 coupled therewith, to other mobile services switching centres, such as MSC2, a public switched telephone network PSTN, and further via the PSTN network to its communication devices, such as a communication device S1 or S3. The communication device S1 comprises for example a telecommunication terminal, such as a modem TE1, and a data processor, such as a computer used as a server SERVER1. It is also possible that the communication device S1 or the data processor comprises means for video telephony, *e.g.* a camera and a display. The communication device S3 comprises for

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In addition, the wireless communication device MS1—MS4 comprises a device identifier, e.g. International Mobile Station Equipment Identity (IMEI). This identifier is stored in the wireless communication device so

that it cannot be altered by the user of the wireless communication device. The IMEI contains information about the device, e.g. a Type Approval Code (TAC), a Final Assembly Code (FAC), a Serial Number (SNR), and a Software Version Number (SVR). Fig. 2 presents an example of the International Mobile Station Equipment Identity IMEI of prior art as defined in the European Telecommunication Standards Institute standard GSM 02.16 "Digital cellular telecommunications system; International Mobile station Equipment Identities (IMEI)" (November 1996). The mobile communication network can perform an IMEI check at any time e.g. to prevent access to the network from illegal devices, stolen devices, etc.

The mobile services switching centre MSC1 can perform an IMEI check to find out whether the wireless communication device MS1 is permitted for use. The European Telecommunication Standards Institute standard GSM 02.16, sections 4 "Use of the equipment identity register" and 5 "Procedure" (November 1996) provide information about the IMEI check in the GSM. In the mobile communication network PLMN there is advantageously provided an equipment identity register (not shown), which comprises a white list which is composed of number series of device identities that are permitted for use, a black list which is composed of number series of device identities that should be barred, and possibly a grey list which is composed of number series of device identities that need not be barred but are tracked by the mobile communication network PLMN. Advantageously during the IMEI check, the mobile services switching centre MSC1 compares the Type Approval Code, the Final Assembly Code, and the Serial Number of the IMEI with number series of the device identities in the white list, in the black list and possibly in the grey list to accept or deny the authentication request of the wireless communication device MS1.

With reference to Fig. 1, if the public land mobile network PLMN based on a cellular network and its communication devices, such as wireless communication devices MS1—MS4, are compatible with the GSM system, the network can also comprise at least one serving GPRS support node SGSN, communicating with a base station controller, such as the base station controller BSC2, as well as a gateway GPRS support node GGSN communicating with the same. The gateway

GPRS support node GGSN is the support node with which the general packet data network PDN communicates. Communication devices in this PDN network, such as the communication device S2, comprise a telecommunication terminal TE2, and a data processor, such as a computer used as a server SERVER2. The gateway GPRS support node GGSN contains information for addressing the protocol data units (PDU) entering from the PDN network to the serving GPRS support node SGSN with which the communication device, such as wireless communication device MS4, communicates. These data packets comply with the protocol definition of the data transmission connection, such as the Internet protocol (IP), X.25 or CLNP, and they also contain the address of the destination communication device. The serving GPRS support node SGSN and the gateway GPRS support node GGSN can support several protocol definitions for connections of a landline network PDN, and they are usually selected by the network operator. The gateway GPRS support node GGSN and the serving GPRS support node SGSN can also be located together in the same device. There is a register GR, e.g. in the SGSN, which contains information about wireless communication devices registered in the gateway GPRS support node GGSN, such as their IMSI identifications and addresses for addressing the PDU data packets in the network. Usually, the serving GPRS support node SGSN also communicates with the mobile services switching centre, such as the mobile services switching centre MSC1 according to Fig. 1, in order to enable data exchange. The mobile services switching centre MSC1 transmits e.g. information on wireless communication devices registered therein to the serving GPRS support node SGSN.

Of the existing frequency range for radio connections, only an allocated frequency band is available to the mobile communication network, and further, as shown in Fig. 1, part of this is used by the radio channel intended for communication between the base transceiver station BTS1 and the wireless communication device MS1 by means of radio communication RC1. Usually, there are several radio channels available for use by the base transceiver station BTS1 for communication between several wireless communication devices MS1 and MS3 and the base transceiver station BTS1. For example in the

digital GSM system, there are 124 radio channels available, with an inter-channel frequency difference of 200 kHz.

5 The physical radio channel is further divided in the time domain into logical radio channels, whereby each logical radio channel is allocated its own time span in the time domain. Thanks to this arrangement, the same physical radio channel can be used in data transmission between several wireless communication devices, such as the wireless communication devices MS1 and MS3 and the base transceiver station
10 BTS1 in Fig. 1. In digital time division multiple access (TDMA) systems of prior art, such as D-AMPS, GSM and JDC/PDC, the above-described system is used for dividing a physical radio channel in the time domain into logical radio channels. For example in the digital GSM system, the physical radio channel is divided into eight logical radio channels.
15 Usually the logical radio channels are also further divided into traffic channels (TCH) which are used for the transmission of *e.g.* speech and data, and control channels which are used for the transmission of messages relating to network function and messages for maintaining the network and the radio channels. Example control channels are the Broadcast Control Channel (BCCH) and the Common Control Channel (CCCH).
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Other communication systems include digital code division multiple access CDMA systems, such as the present IS-95 and future wideband
25 code division multiple access (WCDMA) systems. In these systems the radio channels are not necessarily separated by frequency but *e.g.* by a so called pseudo-random code. It will be appreciated by those skilled in the art that application of the invention described in this text is not limited to any particular form of wireless communication network.

30 Figure 3 is a reduced block diagram showing the wireless communication device MS available for use in the system of Fig. 1. Primarily, the block diagram shows those blocks which are important for disclosing the present invention. It is obvious that the wireless communication device of the sender, such as the wireless communication device MS1 shown in Fig. 1, and the wireless
35 communication device of the recipient, such as the Communicator MS4 shown in Fig. 1, are not necessarily exactly similar to each other. In the

block diagram of Fig 3, the control unit 5 consists of e.g. a micro controller unit 5a (MCU) and an application specific integrated circuit 5b (ASIC). Furthermore, the wireless communication device MS contains a keypad 6, a display 7, an ear piece 8, a microphone 11, memory means 9 comprising e.g. a non-volatile read-only memory (ROM) for storing programs and system information etc. and a random access memory (RAM) for storing information during the operation of the wireless communication device MS. The wireless communication device MS also comprises a radio part 12 with the necessary means for setting up a connection, transmitting information from the wireless communication device MS to the mobile communication network and means for receiving information from the mobile communication network. Figure 3 also shows a SIM card 14 and means 15 for connecting the SIM card to the wireless communication device MS. The wireless communication device MS, usually a mobile phone or PCMCIA radio card, can also be used in connection with a data processor 17, such as a PC device or a PDA device, as a so-called wireless modem. Thus the wireless communication device MS also comprises means 16 for connecting the data processor 17 with the wireless communication device MS. The data processor 17 is used for setting up a data transmission connection by means of the wireless communication device MS and the mobile communication network to another communication device, such as the wireless communication device MS2 or the communication device S1 formed by the modem TE1 and the computer SERVER1 in Fig. 1.

With reference to Fig. 1, for example the wireless communication devices MS1—MS4 operating in the GSM system must have at least one SIM module (subscriber identity module) containing a memory for storing subscriber-specific identification data about the mobile subscriber of the wireless communication device. This identification data includes the IMSI identification and the telephone number of the mobile subscriber. Also, messages transmitted by the short message services (SMS) of the mobile communication network can be stored in the memory of the SIM module. Moreover, the address of the visitor location register (VLR) for maintaining the information on the wireless communication device can be temporarily stored in the SIM module. By means of the subscriber-specific identification data, messages and

calls from other wireless communication devices or a public land telephone network can be addressed to the correct wireless communication device. The operation of the wireless communication device is prior art to a person skilled in the art, whereby its disclosure in more detail is rendered unnecessary in this context.

The method of the present invention can be implemented in the operational software of currently available wireless communication devices. Thus, no changes are necessarily required in the hardware of the wireless communication device in order to apply the invention. The values of the parameters describing the properties of the wireless communication device can be stored in the memory means 9 of the wireless communication device MS, from which they are read, when necessary, by the operational software of the wireless communication device and transmitted to the communication network. The values of the parameters can be located in a non-volatile memory of the wireless communication device, e.g. in the ROM or RAM memory so that the information is not lost when the wireless communication device is switched off, and preferably in a way that they cannot be altered or erased by the user of the device. However, in future communication systems it may be possible to modify at least a part of the IMEI (or its equivalent). The modifiable part may include e.g. information about peripherals connected to the wireless communication device. The modification may be done by, for example, a manufacturer of a wireless communication device, or by a service person, when the user wants to update e.g. the software of the device. The modification of the IMEI may also be allowed by a sales person or by the user when, for example, the user wants to connect some peripherals to the device. Application of the method may also require changes in the communication network, for example in the operational software of the mobile services switching centre.

In the following, the application of the method of the invention will be described in detail in mobile communication networks complying with the GSM and the GSM GPRS standards, but it will be appreciated by a person skilled in the art that the method can also be applied in other mobile communication networks based on a cellular network within the

scope of the claims and in particular in future networks such as the UMTS Universal Mobile Telephone System.

5 Properties of the receiving wireless communication device, such as a mobile phone, Communicator or multimedia communication device, affecting the use of above-mentioned multimedia services include for example, the following information about:

- the mobile networks supported (such as various GSM networks, UMTS),
- 10 - the supported mobile network versions (e.g. UMTS/GPRS phase),
- supported bearer services,
- supported data transfer protocols,
- possible support for external application execution environment (MExE classmark),
- 15 - SIM Application Toolkit Class,
- display attributes (e.g. resolution, colour/bw, number of colours/gray scales),
- image coding methods supported by the communication device, and their parameters,
- 20 - audio coding methods (codec) supported by the communication device, and their parameters,
- service-specific data transmission rate(s),
- service-specific data transmission mode(s) (e.g. SMS, HSCSD, GPRS),
- 25 - maximum data transmission rate of the data transmission mode(s),
- maximum allowable size of graphic files,
- properties of the keypad of the wireless communication device,
- properties of the control device (e.g. mouse, pointer ball, joystick) of the wireless communication device,
- 30 - peripherals of the wireless communication device, and
- Internet presentation modes (e.g. Java, HTML versions) supported by the wireless communication device.

35 In addition, the properties of the receiving wireless communication device can also include user preferences, for example information about:

- the preferred audio/video codec,
- the preferred character set (e.g. cyrillic or western/latin fonts),

- the language preferences (e.g. primary and secondary language), and
- the preferred input device.

5 When a wireless communication device MS1 is switched on, it advantageously attempts to make contact with a mobile communication network PLMN, e.g. a GSM cellular network. The particular mobile communication network PLMN to be contacted may be selected either automatically or manually. The wireless communication device MS1
10 looks for a suitable cell of the chosen mobile communication network PLMN and chooses that cell to provide available services, and tunes to its control channel (e.g. BCCH and CCCH in GSM cellular network). This selection process is known as "camping on the cell". The wireless communication device MS1 then registers its presence in the location area (LA) of the chosen cell if necessary, by means of a location update (LU) or IMSI attach procedure. If the wireless communication device MS1 loses coverage of a cell, it hands over to the most suitable alternative cell of the selected mobile communication network PLMN and starts to use that cell. If the new cell is in a different location area, a
15 location update request is performed. If the wireless communication device MS1 loses coverage of a mobile communication network PLMN, either a new mobile communication network is selected automatically, or an indication of which mobile communication networks are available is given to the user, so that manual selection can be made.

25 When the wireless communication device MS1 is registered to a mobile communication network PLMN, it is able to receive system information from the mobile communication network PLMN via the base transceiver station BTS1, BTS2, BTS3 of the cell in question. If the wireless communication device MS1 wishes to initiate a call, it can do this by initially accessing the network on the control channel of the cell on which it is camped. If the mobile communication network PLMN receives a call for the wireless communication device MS1, it knows (in most cases) the location area of the cell in which the wireless
30 communication device MS1 is camped. It can then send a "paging" message for the wireless communication device MS1 on control channels of all the cells in the location area. The wireless communication device MS1 will then receive the paging message

because it is tuned to the control channel of a cell in that location area, and the wireless communication device MS1 can respond on that control channel.

5 During the registration procedure the wireless communication device and the mobile communication network carry out signalling to exchange information, such as the identification information of the wireless communication equipment, information about the ciphering mode, etc. In the present invention there is provided a new and more
10 comprehensive way to exchange information about properties of the wireless communication equipment than in prior art systems. Fig. 4 shows an exemplified diagram of the messages exchanged during the registration procedure according to an advantageous embodiment of the present invention. The mobile communication network PLMN sends
15 an authentication request message 301 to the wireless communication device MS1. The authentication request message 301 contains e.g. the parameters necessary to calculate the authentication response parameters. It also contains a ciphering key sequence number allocated to the ciphering key. The wireless communication device MS1
20 processes the received information and responds to the authentication request message by sending an authentication response message 302 to the base transceiver station BTS1 with which the wireless communication device MS1 is in communication. The information included in the authentication response message is forwarded to the
25 mobile services switching centre MSC1 of the mobile communication network PLMN, where the information is handled.

After the wireless communication device MS1 is authorized, the mobile communication network PLMN sends a cipher mode command 303 to
30 the wireless communication device MS1. The cipher mode command is used *inter alia* to inform the wireless communication device MS1 if ciphering of information (encryption) is available in the mobile communication network PLMN. If ciphering is available, the wireless communication device MS1 sets some security parameters for
35 ciphering and begins to send information in enciphered format. Then the wireless communication device MS1 sends a cipher mode complete message 304 to the mobile communication network PLMN.

After the mobile communication network PLMN has received the cipher mode complete message from the wireless communication device MS1, it performs an identification procedure. The identification procedure is used by the mobile communication network PLMN to request certain specific identification parameters, e.g. International Mobile Subscriber Identity and International Mobile Station Equipment Identity. The mobile communication network PLMN sends an identification request message 305 to the wireless communication device MS1. The identification request message 305 specifies the requested identification parameters (e.g. IMSI and IMEI) in an identity type information element. Upon receipt of the identity request message the wireless communication device MS1 sends back an identity response message 306. The exact form of the messages used can vary according to the kind of the system.

The identity response message 306 contains the identification parameters as requested by the mobile communication network PLMN. In the preferred embodiment of the present invention the identity response message 306 also contains the information about the properties of the wireless communication device MS1 additional to that provided according to prior art. In this embodiment this information is included in a ME-frame 401 (Mobile Equipment). In the preferred embodiment of the present invention the ME-frame 401 provides all the information of the prior art IMEI, but includes an additional data field: a Capability Information Indicator (CII) field 406. Fig. 5 presents an advantageous example of the ME-frame 401, which includes a Type Approval Code (TAC) field 402, a Final Assembly Code (FAC) field 403, a Serial Number (SNR) field 404, a Software Version Number (SVR) field 405 and the CII field 406. The SVR field 405 contains information about the software version of the wireless communication device MS1. This software version information can be used to some extent to evaluate the properties of the wireless communication device MS1. However, there are many properties which are not necessarily dependent on the software, e.g. the resolution of the display, properties of the keypad, properties of the control device, maximum data transmission rate, etc. The CII field may also include additional information about the software as well as information about peripherals shipped as standard with the communication device. It is therefore

The IMEI is stored on the wireless communication device MS1. Therefore, the properties information included in the CII field 406 is not affected by the SIM module inserted in the wireless communication device MS1. Advantageously (and, as is specified in existing standards), the IMEI cannot be modified by the user.

35 In the mobile communication network PLMN the identification response
message 306 is examined and the property information is stored (block
307 in Fig. 4) in the mobile communication network PLMN,

advantageously in that mobile services switching centre MSC1 which is serving the wireless communication device MS1.

At this stage the mobile communication network PLMN is aware of the properties of the wireless communication device MS1. When there is a call coming to the wireless communication device MS1, the mobile communication network PLMN may now check, if the wireless communication device MS1 is able to receive and handle that call. For example, the call might be a video call from another wireless communication device MS2. This situation is presented as an arrow 308 in Fig. 4. When there is a call coming to the wireless communication device MS1 (Mobile terminated call) from e.g. a telephone of the PSTN network or another wireless communication device MS2, the operator of the telephone network transmits e.g. the number of the addressee's wireless communication device MS1 to the mobile services switching centre. The mobile services switching centre retrieves the rights of the mobile subscriber in question from the home location register HLR and the visitor location register VLR. After this, the mobile communication network PLMN checks the property information of the wireless communication device MS1 to find out if the call can be set up. In the above mentioned video call situation, the mobile communication network PLMN determines whether the addressee's wireless communication device MS1 comprises means for receiving and displaying video information. If the addressee's wireless communication device MS1 comprises such means the video call can be set up, otherwise the call is not set up and the caller is advantageously informed of that. If the call can be set up, the mobile communication network PLMN and the wireless communication device MS1 transmit control and identification data required for call set-up.

The addressee's wireless communication device MS1 and the caller's wireless communication device MS2 do not necessarily have the same kind of video properties. For example, the resolution and/or the number of colours/gray scales may be different in wireless communication devices MS1, MS2. In such a case the mobile communication network PLMN and/or the caller's wireless communication device MS2 may comprise means to convert transmitted video information into a format suitable for the receiving wireless communication device MS1, MS2.

During the call set-up, the mobile communication network PLMN preferably checks if the conversion of video signal is needed and if the quality of the converted signal will be sufficiently good. If the conversion reduces the quality of the video signal too much, the call is preferably not set up at all.

Advantageously the mobile communication network PLMN can use the property information to optimize the communication connection according to the type of call and according to the information to be transmitted. For example, the mobile communication network PLMN can select appropriate communication parameters for a data call according to the supported data rates of the wireless communication device MS1. The property information can also be used to select an appropriate bearer service or services for each call. These optimization and selection processes require significantly less signalling compared to prior art systems during the call set-up phase, because the required information is already available in the mobile communication network PLMN.

The mobile communication network PLMN may request the property information from the wireless communication device MS1 substantially any time while the wireless communication device MS1 is in communication with the mobile communication network PLMN, including handover. The purpose of the handover is to ensure that the connection to the wireless communication device MS1 is maintained as it moves from one base station system BSS area to another. Handover can take place between base stations BTS1, BTS2, BTS3 connected to the same mobile switching centre MSC1 (Intra-MSC handover), or between base stations connected to different mobile switching centres MSC1, MSC2 (Inter-MSC handover).

In a situation where the other party of the call is e.g. a communication device S1, S2 of a service provider, the property information of the wireless communication device MS1 is advantageously transmitted to the communication device S1, S2. Alternatively, the communication device S1, S2 may contact the mobile communication network PLMN to obtain the property information of the wireless communication device MS1. The property information can then be used to optimize the data

transmission during the call. The mobile services switching centre transmits a message consisting of the parameters describing the properties of the wireless communication device MS1 to the communication device S1, S2, which also acknowledges the receipt of this data. For this purpose, a protocol selection, such as IP or X.25, is made between the mobile services switching centre and the communication device. It is obvious that the messages used for transmitting the parameters and the acknowledgements on the receipt of the messages can vary in their content depending on whether the messages are transmitted between the wireless communication device and the mobile services switching centre or between the mobile services switching centre and the communication device. On the basis of the received data, the server of the communication device S1, S2 optimises the data to be transmitted to correspond to the properties of the wireless communication device MS1, after which optimised data transmission can be initiated. According to the invention, optimisation of the properties of the radio link can also be performed on the basis of the properties detailed in the IMEI i.e. preferences for data transmission modes. The communication device S1, S2 is advantageously coupled directly with the mobile services switching centre of the mobile communication network PLMN. Preferably data transmission takes place using a radio connection between the wireless communication device MS1 and the mobile services switching centre. However, the method can also be easily implemented in other mobile communication networks, such as the D-AMPS and JDC/PDC cellular networks.

By using the parameter data provided from the mobile communication device MS1, it is possible to optimise any incoming information for use of the terminal, and/or to optimise the transmission of the information between the communication network and the mobile communication device MS1.

In order to optimise data transmission from a server, for example a high resolution graphics file may be reduced to a lower resolution that can be displayed on the display of a particular wireless communication device MS1. Thus, when transmitting a graphics file, it is also possible to convert the original coding of the image, e.g. GIF, JPEG or TIFF, into another type of coding, whereby the data transmission connection is

used as efficiently as possible. The contents of the graphics file may then be reproduced by the display device of the destination communication device MS1, or the coding can be interpreted by the communication device with its application software. It is often possible to reduce the resolution of an image without hampering the interpretation of the information in the image or significantly reducing image quality. By selection of the coding, it is also possible to affect the graphics file to be transmitted, whereby smaller files can be transmitted faster. In another example, the transmission rate, as well as the resolution, of a video image stored in the server can be adapted to better correspond *e.g.* to the reproduction capacity of the wireless communication device or to the capacity of the data transmission connection, *e.g.* a radio connection. This can take place for example by re-coding and pre-processing of the video image to be transmitted. This can also be conducted in connection with transmission of a real-time video image, such as a video conference. Thus, the video image to be transmitted is re-coded to suit the radio transmission channel used in communication, for example the HSCSD service or the GSM GPRS network. In a further example, the server can take into account the properties of the input means of the receiving communication device, such as the properties of the keypad and the properties of the control device, for example a mouse, joy-stick or pointer ball, or their possible lack in the device. Thus a form to be transmitted, such as an Internet page or a page of a spreadsheet (computation software) that must be completed by the user of the wireless communication device MS1 or requires input from the user of the wireless communication device MS1, can be transmitted to the device in a suitable form. Also, the properties of the receiving device can be taken into account *e.g.* in a case that the device only supports a certain presentation protocol, such as a particular HTML version. It is particularly important to take into account the properties of the device when loadable program codes such as Java script are used.

A fundamental purpose of registering the wireless communication device in a mobile communication network, such as the GSM GPRS network, is to determine the location of the wireless communication device in the mobile communication network PLMN by means of the identification data, such as the IMSI and IMEI identification. This is

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necessary for correct routing of the data packets addressed to the wireless communication device, for example for addressing PDU data packets from a PDN network to a GPRS serving GPRS support node SGSN serving the wireless communication device. In connection with
5 registration, the network can also be informed of the rights and properties of the wireless communication device MS1 as described above.

The mobile services switching centre MSC1, MSC2 maintains
10 information on the wireless communication devices registered in it, such as their IMSI identifications. According to another advantageous embodiment of the method of the invention, the mobile services switching centre MSC1 requests the information describing the properties of the wireless communication device MS1 e.g. when the
15 wireless communication device is registered in the mobile services switching centre and then the property information is stored in the mobile services switching centre MSC1, for example in the home location register HLR or in the visitor location register VLR. In connection with a mobile-originated call, the mobile services switching
20 centre retrieves this data from its registers and transmits it to the server S1, S2 offering multimedia services. Thus, the wireless communication device does not need to transmit its property information to the mobile services switching centre in connection with each call. If necessary, the mobile services switching centre asks the wireless communication
25 device for its property information.

In accordance with another advantageous embodiment of the invention, the above-mentioned property information can also be transmitted from the mobile services switching centre MSC1, MSC2 to the server S1, S2
30 upon a mobile-terminated call. Thus, the server offering multimedia services contacts the mobile services switching centre MSC1, MSC2 for setting up a data transmission connection with the wireless communication device, relating to e.g. a service ordered earlier by the mobile subscriber. In the mobile services switching centre MSC1,
35 MSC2 in question, the property information of the wireless communication device is stored, and this property information is transmitted to the server S1, S2.

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Claims:

1. A method for storing and informing at least one property of a wireless communication device (MS1—MS4) to a mobile communication network (PLMN), **characterized** in that parameter data representing said at least one property of said wireless communication device (MS1—MS4) is stored in said wireless communication device (MS1—MS4), and transmitted from said wireless communication device (MS1—MS4) to the mobile communication network (PLMN).
2. The method according to claim 1, **characterized** in that said parameter data is transmitted from said wireless communication device (MS1—MS4) to the communication network in connection with registration of said wireless communication device (MS1—MS4) to the mobile communication network (PLMN).
3. The method according to claim 1 or 2, **characterized** in that said parameter data is transmitted from said wireless communication device (MS1—MS4) to the communication network prior to a call being set-up with said wireless communication device (MS1—MS4).
4. The method according to claim 3, **characterised** in that the parameter data is checked to determine if it is appropriate for the type of call during call set-up with said wireless communication device (MS1—MS4), wherein a call is not established if the parameter data is not appropriate for the type of call.
5. The method according to claim 1, 2, 3 or 4, **characterized** in that said parameter data is transmitted from said wireless communication device (MS1—MS4) to the communication network in connection with a handover.
6. The method according to any of the claims 1 to 5, **characterised** in that the parameter data is transmitted to a mobile services switching centre (MSC1) of the mobile communication network (PLMN), or a serving GPRS support node (SGSN).

7. The method according to any of the claims 1 to 6, in which method an International Mobile Station Equipment Identity (IMEI) is defined for said wireless communication device (MS1—MS4), **characterised** in that the parameter data is stored in the International Mobile Station Equipment Identity (IMEI).
8. The method according to claim 7, **characterised** in that the International Mobile Station Equipment Identity (IMEI) comprises at least one field for storing the parameter data, and that the length of said field is fixed.
9. The method according to claim 7, **characterised** in that the International Mobile Station Equipment Identity (IMEI) comprises at least one field for storing the parameter data, and that the length of said field is variable.
10. The method according to claim 7, 8 or 9, **characterised** in that the International Mobile Station Equipment Identity (IMEI) is divided to a non-modifiable part and a modifiable part, and that at least part of the parameter data is stored in said modifiable part.
11. The method according to any of the claims 7 to 10, **characterised** in that the International Mobile Station Equipment Identity (IMEI) is stored in connection with manufacturing of the wireless communication device (MS1—MS4).
12. The method according to any of the claims 7 to 11, **characterised** in that the International Mobile Station Equipment Identity (IMEI) is updated in connection with changes of the properties of the wireless communication device (MS1—MS4).
13. The method according to any of the claims 1 to 12, **characterised** in that the parameter data transmitted from said wireless communication device (MS1—MS4) is stored at least in the mobile services switching centre (MSC1) of the mobile communication network (PLMN).

14. The method according to any of the claims 1 to 13, **characterised** in that the parameter data is stored temporarily in the mobile communication network (PLMN).
15. The method according to any of the claims 1 to 14, **characterised** in that the wireless communication device (MS1—MS4, S3) is a mobile phone.
16. The method according to any of the claims 1 to 14, **characterised** in that the wireless communication device (MS1—MS4) is a Communicator.
17. The method according to any of the claims 1 to 14, **characterised** in that the wireless communication device (MS1—MS4) is a radio card.
18. The method according to any of the claims 1 to 17, **characterised** in that the parameter data contains information about the hardware properties of the wireless communication device (MS1—MS4).
19. The method according to any of the claims 1 to 18, **characterised** in that the parameter data contains information about the software properties of the wireless communication device (MS1—MS4).
20. The method according to any of the claims 1 to 19, **characterised** in that the parameter data contains information about the preferences of the user of the wireless communication device (MS1—MS4).
21. The method according to any of the claims 1 to 20, **characterised** in that modification of the parameter data by the user of the wireless communication device (MS1—MS4) is prevented.
22. The method according to any of the claims 1 to 21, further comprising steps for establishing a call for transmitting information from a first communication device (MS1—MS4) to a second communication device (MS1—MS4, S1, S2), **characterized** in that said second communication device is a wireless communication device (MS1—MS4), and that the information is optimised for use by the second communication device, by using the parameter data.

23. The method according to any of the claims 1 to 22, further comprising steps for performing communication between the communication network (PLMN) and another communication device (MS1—MS4, S1, S2), **characterized** in that the parameter data is transmitted to another communication device (MS1—MS4, S1, S2).

24. The method according to any of the claims 1 to 23, further comprising steps for performing communication between the communication network (PLMN) and another communication network (PSTN, PDN), **characterized** in that the parameter data is transmitted to another communication network (PSTN, PDN).

25. The method according to any of the claims 1 to 24, where information is transmitted from a first communication device (MS1) to a second communication device (MS2), **characterized** in that said second communication device is a wireless communication device (MS1—MS4), and that information to be transmitted is converted into a format suitable for the second wireless communication device (MS2) in the first communication device (MS1).

26. The method according to any of the claims 1 to 24, where information is transmitted from a first communication device (MS1) to a second communication device (MS2), **characterized** in that said second communication device is a wireless communication device (MS1—MS4), and that information to be transmitted is converted into a format suitable for the second wireless communication device (MS2) in the communication network (PLMN).

27. A wireless communication device (MS1—MS4) comprising means (5, 12) for informing at least one property of said wireless communication device (MS1—MS4) to a mobile communication network (PLMN), **characterised** in that the wireless communication device (MS1—MS4) further comprises:

— means (5, 9) for storing parameter data representing said at least one property of the wireless communication device (MS1—MS4), and

— means (5, 12) for transmitting the parameter data from the wireless communication device (MS1—MS4) to said mobile communication network (PLMN).

5 28. The wireless communication device (MS1—MS4) according to claim 27, **characterized** in that it comprises means (ANT, 12) for transmitting said parameter data to the communication network in connection with registration of said wireless communication device (MS1—MS4) to the mobile communication network (PLMN).

10 29. The wireless communication device (MS1—MS4) according to claim 27 or 28, **characterized** in that it comprises means (ANT, 12) for transmitting said parameter data to the communication network prior to a call being set-up with said wireless communication device (MS1—MS4).

15 30. The wireless communication device (MS1—MS4) according to claim 27, 28, or 29, **characterized** in that it comprises means (ANT, 12) for transmitting said parameter data transmitted from said wireless communication device (MS1—MS4) to the communication network in connection with a handover.

20 31. The wireless communication device (MS1—MS4) according to claim 30 comprising an International Mobile Station Equipment Identity (IMEI), **characterized** in that the parameter data is stored in the International Mobile Station Equipment Identity (IMEI).

25 32. The wireless communication device (MS1—MS4) according to claim 31, **characterized** in that the International Mobile Station Equipment Identity (IMEI) comprises at least one field for storing the parameter data, the length of said field being fixed.

30 33. The wireless communication device (MS1—MS4) according to claim 32, **characterized** in that the International Mobile Station Equipment Identity (IMEI) comprises at least one field for storing the parameter data, said field being of a variable length.

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35. The wireless communication device (MS1—MS4) according to claim 31, 32, 33 or 34, **characterized** in that the International Mobile Station Equipment Identity (IMEI) is stored in connection with manufacturing of the wireless communication device (MS1—MS4).

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38. The wireless communication device (MS1—MS4) according to any of the claims 27 to 36, **characterized** in that it is a Communicator.

39. The wireless communication device (MS1—MS4) according to any of the claims 27 to 36, **characterized** in that it is a radio card.

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said wireless communication device (MS1—MS4) to said mobile communication network (PLMN), **characterised** in that the system comprises further:

- 5 — means (5, 9) for storing parameter data representing said at least one property of the wireless communication device (MS1—MS4) in the wireless communication device (MS1—MS4), and
- 10 — means (5, 12) for transmitting the parameter data from the wireless communication device (MS1—MS4) to said mobile communication network (PLMN).

42. The wireless communication system according to claim 41, **characterized** in that it comprises means (ANT, 12) for transmitting said parameter data from said wireless communication device (MS1—MS4) to the communication network (PLMN) in connection with registration of said wireless communication device (MS1—MS4) to the mobile communication network (PLMN).

43. The wireless communication system according to claim 41 or 42, **characterized** in that it comprises means (ANT, 12) for transmitting said parameter data from said wireless communication device (MS1—MS4) to the communication network (PLMN) prior to a call being set-up with said communication network (PLMN).

44. The wireless communication system according to claim 43, **characterized** in that it comprises means (5) for checking the parameter data to determine if it is appropriate for the type of call during call set-up with said wireless communication device (MS1—MS4), wherein a call is not established if the type of the parameter data is not appropriate for the type of call.

45. The wireless communication system according to any of claims 41 to 44, **characterized** in that it comprises means (ANT, 12) for transmitting said parameter data from said wireless communication device (MS1—MS4) to the communication network (PLMN) in connection with a handover.

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5 47. The wireless communication system according to any of claims 41 to 46, characterized in that the mobile communication network (PLMN) comprises means (MSC1) for storing the parameter data received from said wireless communication device (MS1—MS4).

49. The wireless communication system according to claim 47 or 48, comprising a register (GR), **characterized** in that the parameter data is stored in said register (GR).

51. The wireless communication system according to any of claims 47 to 50, further comprising means for communication between the communication network (PLMN) and another communication network (PSTN, PDN), characterized in that the mobile communication network (PLMN) comprises means (MSC1) for transmitting the parameter data to another communication network (PSTN, PDN).

52. The wireless communication system according to any of claims 41 to 50, further comprising means for establishing a call for communication between the wireless communication device (MS1—MS4) and another communication device (MS1—MS4, S1, S2),

communication device (MS1—MS4) to said mobile communication network (PLMN), characterised in that the support node (SGSN) comprises further means (5, 9) for storing parameter data representing said at least one property of the wireless communication device (MS1—

5 MS4).

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Abstract

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(Fig. 4)

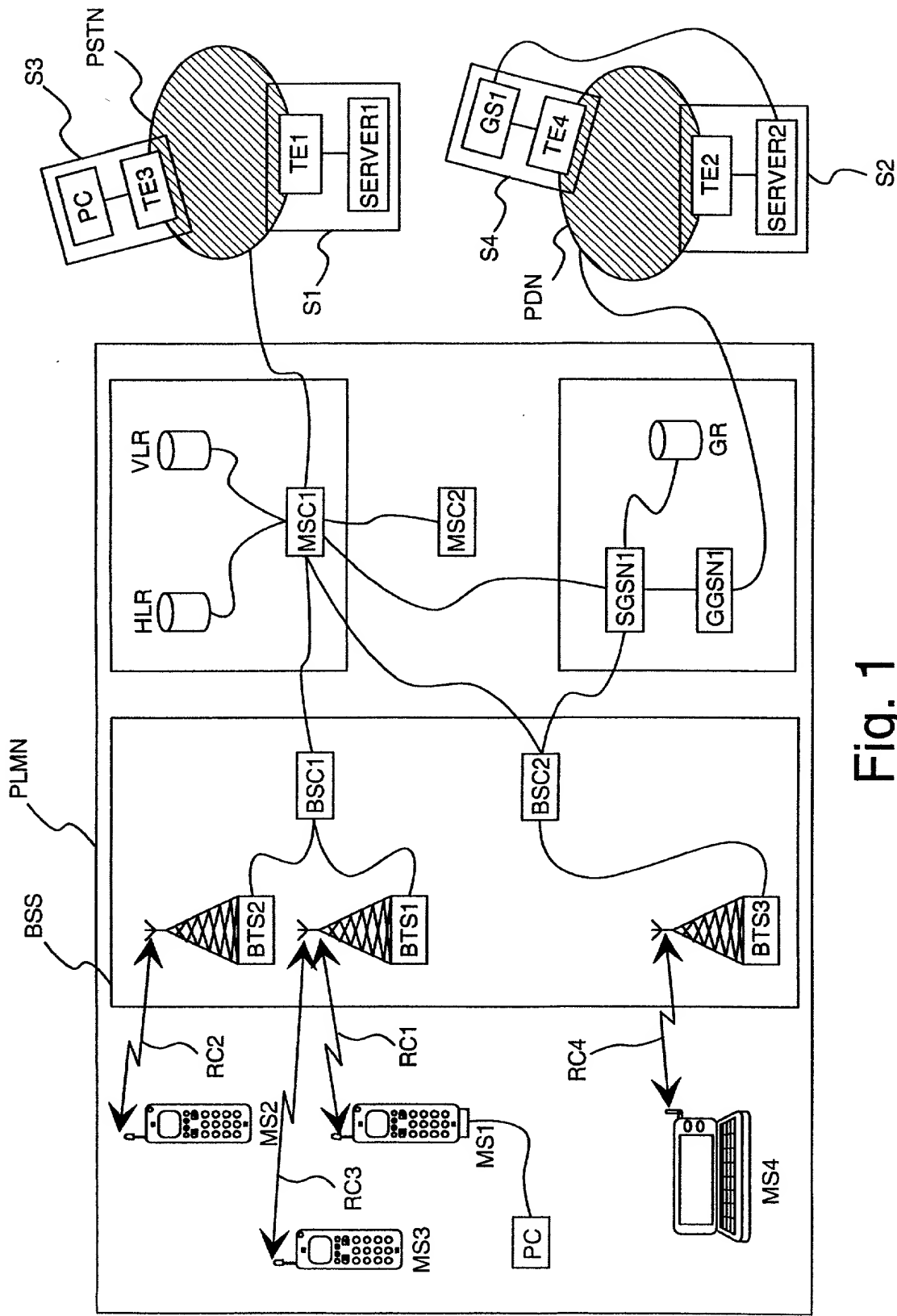


Fig. 1

